

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Cancel claim 1 without prejudice.
Amend claims 2 and 3 as follows.
Add new claims 4-37.

Listing of Claims:

- 1 1. (canceled)
- 1 2. (currently amended) The ~~method~~ apparatus as recited in claim
2 + 5 further comprising:
3 a means for dynamic management of the windows.
- 1 3. (currently amended) The ~~method~~ apparatus as recited in claim
2 + 2 further comprising:
3 a means for using historical values in present said windows to help
4 populate inserted said windows.
- 1 4. (new) An apparatus for monitoring time series, comprising:
2 one or more registers each for storing received data points of a
3 corresponding time series;
4 means for receiving data points of one or more time series and
5 storing the received data points in the corresponding registers;
6 means for receiving query strings representing queries;
7 means for compiling the received query strings into persistent
8 queries;
9 at least one said persistent query, each defining a query
10 represented by received said query strings, each persistent query being a
11 function of the time series of corresponding one or more trigger registers
12 of the one or more registers;

13 means, responsive to storing of a received data point in a trigger
14 register, for evaluating each persistent query corresponding to the trigger
15 register; and
16 means for outputting a payload of each evaluated persistent query
17 whose event condition has a first value.

1 5. (new) The apparatus of claim 4 wherein:
2 at least one register comprises
3 one or more windows each for maintaining statistics for a
4 corresponding subset of the register's corresponding time series; and
5 at least one persistent query is a function of one or more windows
6 of the corresponding one or more trigger registers.

1 6. (new) The apparatus of claim 5 wherein:
2 each persistent query defines an event condition and a payload
3 specification of the defined query, where at least one of the event
4 condition and the payload specification is a function of the time series of
5 the corresponding one or more trigger registers.

1 7. (new) The apparatus of claim 6 wherein:
2 at least one of the event condition and the payload specification of
3 at least one persistent query is a function of the statistics maintained by at
4 least one window of at least one of the corresponding one or more trigger
5 registers.

1 8. (new) The apparatus of claim 5 comprising:
2 means for performing online computation of the statistics.

1 9. (new) The apparatus of claim 4 comprising:
2 means for dynamic management of persistent queries.

1 10. (new) An apparatus monitoring time series, comprising:
2 means for receiving data points of one or more time series;
3 one or more registers each corresponding to a different one of the
4 time series, each register comprising
5 a buffer for storing a plurality of most-recently received data points
6 of the corresponding time series, and
7 one or more windows, each associated with a subset of the
8 register's corresponding time series, for maintaining statistics for the
9 associated subset;
10 one or more persistent queries each corresponding to one or more
11 trigger registers of the one or more registers and defining an event
12 condition and a payload specification that expresses data that are to be
13 output when the event condition evaluates to a first value;
14 means, responsive to a trigger register storing a newly-received
15 data point, for evaluating the event condition of each persistent query
16 corresponding to the trigger register; and
17 means for outputting the output data specified by the payload
18 specification of each persistent query whose event condition evaluates to
19 the first value.

1 11. (new) The apparatus of claim 10 further comprising:
2 means, responsive to receipt of a data point of a time series, for
3 storing the data point in the buffer of individual said register corresponding
4 to the data point's time series; and
5 online computation means, responsive to the means for storing, for
6 updating the statistics of the windows of the individual register to account
7 for the stored data point.

1 12. (new) The apparatus of claim 11 wherein:
2 the means for storing comprise
3 a register basic lock;

- 4 a register booster lock;
- 5 a window lock; and
- 6 a query lock.

1 13. (new) The apparatus of claim 11 wherein:
2 at least one of the event condition and the payload specification of
3 at least some persistent queries are a function of the statistics of the
4 windows of the trigger registers of the at least some persistent queries.

1 14. (new) The apparatus of claim 10 wherein:
2 the means for receiving comprise
3 an input for receiving a stream of data values each labeled to
4 indicate the time series to which the data value belongs;
5 a filter for determining from each data value's label whether the
6 data value belongs to a time series monitored by the apparatus and
7 discarding those data values that do not belong to a monitored series; and
8 a sequencer for supplying a unique identification number to each
9 filtered data value.

1 15. (new) The apparatus of claim 14 further comprising:
2 means for storing the filtered data value accompanied by the
3 unique identification number and a timestamp in the buffer of the individual
4 register corresponding to the data value's time series; and
5 online computation means, responsive to the means for storing, for
6 updating the statistics of the windows of the individual register to account
7 for the stored filtered data value.

1 16. (new) The apparatus of claim 10 comprising:
2 means for adding a register to the apparatus.

1 17. (new) The apparatus of claim 10 comprising:

2 means for adding a window to a register of the apparatus.

1 18. (new) The apparatus of claim 17 wherein:

2 the means for adding a window comprise

3 a register basic lock;

4 a register booster lock; and

5 a window lock.

1 19. (new) The apparatus of claim 10 comprising:

2 means for dynamic management of persistent queries.

1 20. (new) The apparatus of claim 10 further comprising:

2 an input for receiving a query;

3 a parser for parsing the query into one or more query strings

4 corresponding to the payload specification, the event condition, and the

5 one or more trigger registers; and

6 means for compiling the query strings into a persistent query.

1 21. (new) The apparatus of claim 20 further comprising a query

2 lock.

1 22. (new) A method of monitoring time series, comprising:

2 receiving query strings representing a query;

3 compiling from the received strings a persistent query defining the

4 represented query as a function of one or more time series;

5 receiving data points of the one or more time series;

6 storing the received data points each in a register for storing

7 received data points of a corresponding one of the one or more time

8 series;

9 in response to storing of a received data point in a register, using
10 contents of the register to evaluate each persistent query that is a function
11 of the register's corresponding time series; and
12 outputting a payload of each evaluated persistent query whose
13 event condition has a first value.

1 23. (new) The method of claim 22 wherein:
2 storing the received data points comprises
3 updating statistics of any windows of the registers that store the
4 received data points to account for the stored data points, wherein at least
5 one register comprises one or more said windows each for maintaining the
6 statistics for a corresponding subset of the register's corresponding time
7 series; and
8 using contents of the register comprises
9 using contents of at least one of the one or more windows of the
10 register to evaluate each persistent query that is a function of the
11 register's corresponding time series.

1 24. (new) The method of claim 23 wherein:
2 using contents at of least one of the one or more windows
3 comprises
4 using contents of the at least one window to evaluate at least one
5 of an event condition and a payload specification of the persistent query,
6 where the at least one of the event condition and the payload specification
7 is a function of the register's corresponding time series.

1 25. (new) The method of claim 23 wherein:
2 updating statistics comprises
3 performing online computation of the statistics.

1 26. (new) The method of claim 22 further comprising:

2 dynamically managing the persistent queries.

1 27. (new) The method of claim 23 further comprising:
2 dynamically managing the windows.

1 28. (new) The method of claim 27 further comprising:
2 using historical values in present said windows to help populate
3 inserted said windows.

1 29. (new) A method of monitoring time series, comprising:
2 associating each of one or more registers with a corresponding
3 time series of one or more time series;
4 including in each said register one or more windows each
5 associated with a subset of the register's corresponding time series and
6 maintaining statistics for the associated subset;
7 forming one or more persistent queries each corresponding to one
8 or more trigger registers of the one or more registers and defining an
9 event condition and a payload specification that expresses data that are to
10 be output when the event condition evaluates to a first value;
11 receiving a data point of one of the one or more time series;
12 in response to the receiving, storing the received data point in a
13 buffer for storing a plurality of most-recently received data points of the
14 one time series, of a register that corresponds to the one data series;
15 in response to a buffer of a trigger register storing a newly-received
16 data point, evaluating the event conditions of each persistent query
17 corresponding to the trigger register; and
18 outputting the output data specified by the payload specification of
19 each persistent query whose event condition evaluates to the first value.

1 30. (new) The method of claim 29 further comprising:

2 in response to the buffer of one of the registers storing the newly-
3 received data point, updating statistics of the windows of the one
4 register to account for the stored data point.

1 31. (new) The method of claim 30 wherein:
2 evaluating the event conditions comprises
3 evaluating at least one of the event condition and the payload
4 specification of at least some of the persistent queries corresponding to
5 the trigger registers as a function of the statistics of the windows of the
6 trigger registers of the at least some persistent queries.

1 32. (new) The method of claim 29 wherein:
2 receiving a data point comprises
3 receiving a stream of data values each labeled to indicate the time
4 series to which the data value belongs;
5 determining from each data value's label whether the data value
6 belongs to a time series monitored by the method and discarding those
7 data values that do not belong to a monitored series; and
8 supplying a unique identification number to each data value that is
9 not discarded.

1 33. (new) The method of claim 32 further comprising:
2 storing the not-discarded data value accompanied by the unique
3 identification number and a timestamp in the buffer of the register
4 corresponding to the data value's time series; and
5 in response to the storing, performing online computation to update
6 the statistics of the windows of the register to account for the stored data
7 value.

1 34. (new) The method of claim 29 comprising:
2 adding a register to the one or more registers.

1 35. (new) The method of claim 29 comprising:
2 adding a window to a register to the one or more registers.

1 36. (new) The method of claim 29 comprising:
2 dynamically managing persistent queries.

1 37. (new) The method of claim 29 wherein:
2 forming one or more persistent queries comprises
3 receiving a query;
4 parsing the query into one or more query strings
5 corresponding to the payload specification, the event condition, and the
6 one or more trigger registers; and
7 compiling the query strings into a persistent query.